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PATTERSON & SHERIDAN L.L.P.
595 SHREWSBURY AVE, STE 100
FIRST FLOOR
SHREWSBURY, NJ 07702

EXAMINER	
PRENDERGAST, ROBERTA D	

ART UNIT	PAPER NUMBER
2628	

DATE MAILED: 12/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/727,679	MORETON ET AL.	
	Examiner	Art Unit	
	Roberta Prendergast	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-6,15 and 18-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,15 and 18-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: page 14, paragraph [0038] discloses that "...Fig. 4B edge 80 equals e<0,5>, and in Fig. 4C edge 80 equals e<1,0>..." however, edge 80 equals e<1, 0> in both Figs. 4B and 4C in the drawings. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 26 is objected to because of the following informalities: claim 26 concludes with the phrase "...in relation to a selected vertex of an originating primitive and one neighbor vertex of the selected...". Thus, claim 26 appears to be unfinished and examiner is unable to examine this claim since it is unclear how this claim should be written. Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1, 3-6, 9-15 and 18-29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

This claimed invention does not provide a useful, concrete and tangible result. In determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible and concrete, but rather that the final result is "useful, tangible and concrete."

The tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3-6 and 9-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Independent claim 1, lines 9-11, has been amended to include the limitation of "storing the neighboring primitives associated with the one-ring neighbors based on the assigned neighbor indexes, wherein unique neighbor index includes an offset which is unique to each of the neighboring primitives."

Paragraph 7 of the specification discloses assigning a unique reference to each vertex defining the at least one primitive and a unique neighbor index to each of the one-ring neighbor vertices of each vertex. Paragraph 9 discloses specifying an offset used to locate data for vertex data corresponding to each vertex stored in the memory and combining the offset and unit size with an index to determine an address for accessing vertex data. Paragraph 52 discloses applying a user-defined offset to neighbor indices to specify a consistent order of calculation. However, the specification

does not disclose an offset, which is unique to each of the neighboring primitives as claimed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-6, 12, and 27-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Huang et al. U.S. Patent No. 6825839.

Referring to amended claim 1, Huang et al. teaches a method for execution by a processor for indexing and storing vertex data associated with the vertices that define neighboring primitives to enhance primitive processing by the processor, comprising selecting a reference vertex (Fig. 4; column 4, lines 34-40; column 5, lines 3-12, i.e. a reference vertex is selected in order to generate a vertex neighboring graph VNB for that particular vertex); identifying one-ring neighbor vertices of the reference vertex; assigning a unique reference to each of the one-ring neighbor vertices; assigning a unique neighbor index to each of the one-ring neighbor vertices in a sequential order around the reference vertex (Fig. 4; column 4, lines 34-40; column 5, lines 3-12, i.e. each neighbor of the reference vertex is identified by a unique reference number, for example figure 4 indicates the reference vertex v0 has a unique reference 1 and its one-

ring neighbor vertices v1, v3 and v5 have the reference numbers 3, 4 and 2 respectively, and inserted into VNB of the reference vertex in their unique neighbor index positions of 0, 1 and 2 in a sequential order, such as decreasing reference numbers, around the vertex); and storing the neighboring primitives associated with the one-ring neighbors based on the assigned neighbor indexes (Fig. 4; column 5, lines 3-12, i.e. neighboring primitives are stored in two-dimensional arrays, for example, incident edge table INC stores the list of triangles incident to the edge, such as edge 1,2 stores triangle 0 and VNB stores the one-ring neighbors of the reference vertex, such as VNB(1) stores one-ring neighbors 2, 3 and 4 for reference vertex 1 while triangle list TL stores the triangles used in the model wherein each triangle is represented as an ordered list of the references (indices) to the vertex table, which contains an ordered list of all the vertices used in the model), wherein unique neighbor index includes an offset which is unique to each of the neighboring primitives (Figs. 3, 4 and 10; column 2, lines 44-63; column 4, lines 35-49 and 61-66; column 5, lines 3-12, i.e. each vertex of a triangle mesh is given a unique reference/index in the vertex table VT and a unique index position in a vertex neighborhood graph VNB represented as a two dimensional array and each one-ring neighbor of each vertex is given a unique neighbor index position in an array located at that unique index position for example, for reference vertex 1, represented as VNB(1), neighbor 1 has a unique reference number 2 and has a unique neighbor index of 0, neighbor 2 has a unique reference number 3 and has a unique neighbor index of 1, and neighbor 3 has a unique reference number 4 and has a unique neighbor index of 2 in the two dimensional array).

Referring to claim 3, Huang et al. teaches the method of claim 1, wherein the offset is used to specify a consistent order of calculation for use during primitive processing (Fig. 4; i.e. each one-ring neighbor is processed in ascending order from the first position in the array until the last position).

Referring to claim 4, Huang et al. teaches the method of claim 1, wherein the at least one primitive is a polygonal primitive (Fig. 4 and 6; column 3, lines 60-65, i.e. triangles are polygons).

Referring to claim 5, Huang et al. teaches the method of claim 1, wherein the at least one primitive is a quadrilateral primitive (Fig. 4 and 6; i.e. a quadrilateral primitive is represented by vertices 1, 2, 3, and 4 with vertex 1 having neighbors 2, 3, and 4).

Referring to claim 6, Huang et al. teaches the method of claim 4, wherein the polygonal primitive is a triangular primitive (Fig. 4 and 6; column 3, lines 60-65).

Referring to claim 12, Huang et al. teaches the method of claim 1, further comprising identifying an edge between a first vertex and a second vertex, the second vertex being a one-ring neighbor of the first vertex (Fig. 4; column 5, lines 13-35, i.e. each vertex of each edge in the Incident Edge Table is a one-ring neighbor of the other, for example, for edge (v_0, v_1) vertex v_0 is a one-ring neighbor of vertex v_1 and vertex v_1 is a one-ring neighbor of vertex v_0 since there are no other vertices located between them).

Referring to claim 27, claim 27 recites the limitations of claims 1 and 3 and therefore the rationale for the rejection of claims 1 and 3 is incorporated herein.

Referring to claim 28, the rationale for claim 27 is incorporated herein, Huang et al. teaches the method of claim 27, wherein the offset is determined by the number of one-ring neighbor vertices to a reference vertex (Fig. 4; column 5, lines 3-12, i.e. the offset of the unique neighbor index is determined by the number of one-ring neighbors associated with a reference vertex, for example VNB(1) has three one-ring neighbors and thus neighbor 1 has a unique reference number 2 and a unique neighbor index of [1, 0] which includes the offset 0, neighbor 2 has a unique reference number 3 and a unique neighbor index of [1, 1] which includes the offset 1, and neighbor 3 has a unique reference number 4 and a unique neighbor index of [1, 2] which includes the offset 2).

Referring to claim 29, the rationale for claim 28 is incorporated herein, Huang et al. teaches the method of claim 28, wherein the offset determines the sequence with which neighboring primitives are processed (Fig. 4; i.e. each one-ring neighbor is processed in ascending order from the first position in the array until the last position).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. U.S. Patent No. 6825839 as applied to claims 1 and 4 above, and further in view of Li et al. U.S. Patent No. 6262737.

Referring to claim 9, Huang et al. teaches the method of claim 1 wherein the indexing is related to three-dimensional computer graphics (column 1, lines 20-35) but does not specifically teach wherein the at least one primitive defines a volume.

Li et al. teaches wherein the at least one primitive defines a volume (Figs. 7(a and b) and 9; column 5, lines 45-50; column 13, lines 15-22; column 14, lines 48-60, i.e. a tetrahedron is the simplest primitive that defines a volume while a cube is the next simplest, rectangles are used in the smooth part of a surface while triangles are used to more accurately model areas that are not smooth).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Huang et al. to include the teachings of Li et al. wherein the at least one primitive defines a volume thereby providing the simplest 3-D mesh, since most meshes consist primarily of triangles and quadrangles thus the simplest 3-D mesh would be a tetrahedral or cube mesh, that can be coded as a regular mesh with only a few bits wherein the vertices are indexed prior to processing (column 5, lines 45-50; column 13, lines 19-22; column 14, lines 48-60).

Referring to claim 10, Huang et al. teaches the method of claim 9 but does not specifically teach wherein the at least one primitive is a tetrahedron.

Li et al. teaches wherein the at least one primitive is a tetrahedron (Figs. 7(a and b) and 9; column 5, lines 45-50; column 13, lines 15-22; column 14, lines 48-60, i.e. a tetrahedron is the simplest primitive that defines a volume while a cube is the next simplest, rectangles are used in the smooth part of a surface while triangles are used to more accurately model areas that are not smooth).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Huang et al. to include the teachings of Li et al. wherein the at least one primitive defines a volume thereby providing the simplest 3-D mesh, since most meshes consist primarily of triangles and quadrangles thus the simplest 3-D mesh would be a tetrahedral or cube mesh, that can be coded as a regular mesh with only a few bits wherein the vertices are indexed prior to processing (column 5, lines 45-50; column 13, lines 19-22; column 14, lines 48-60).

Referring to claim 11, Huang et al. teaches the method of claim 9 but does not specifically teach wherein the at least one primitive is a cube.

Li et al. teaches wherein the at least one primitive is a cube (Figs. 7(a and b) and 9; column 14, lines 48-60, i.e. rectangular patches are used to represent smooth surfaces and a 3d base mesh would be cubical in the areas comprised of rectangular patches).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Huang et al. to include the teachings of Li et al. wherein the at least one primitive defines a volume thereby providing the simplest 3-D mesh, since most meshes consist primarily of triangles and quadrangles thus the simplest 3-D mesh would be a tetrahedral or cube mesh, that can be coded as a regular mesh with only a few bits wherein the vertices are indexed prior to processing (column 5, lines 45-50; column 13, lines 19-22; column 14, lines 48-60).

Response to Arguments

Applicant's arguments filed 5/26/2006 and 8/10/2006 have been fully considered but they are not persuasive.

Applicant indicates, on page 6, 1st paragraph of the remarks filed 5/26/2006 that figure 4 has been corrected to eliminate the issues that resulted in the objection to the drawings. However, an amended replacement drawing sheet was not submitted, therefore the drawings stand objected.

Applicant argues, with respect to the arguments filed 5/26/2006, "...None of the above features, especially the approach to storing neighboring primitives by the vertices which define the primitives and adopting an offset which is unique to each of the primitives to establish an order of calculation, is found in the Huang reference relied on by the Examiner. Rather, Huang, uses identified vertices, as explained at column 2, lines 60-65, for a process called skeletonization, which is the process of deriving a skeleton of an input model where the skeleton is a fully collapsed body of the model. In particular, Huang does not store neighboring primitives by their vertices and define one-ring neighbor vertices, as claimed. Rather, in Huang, a sequence of vertices is stored that is independent of the order of one-ring neighbors (figure 6A). Each pair of vertices is then used to contract an edge of a primitive, so that following the steps B-E of figure 6, each of the edges is contracted to form a fully collapsed skeleton. The Huang reference fails to teach the storage of neighboring primitives by their vertices, and then using that stored data to process the neighboring primitives. Rather than processing of

primitives, Huang teaches only the processing of edges and the collapsing of those edges. The Lee citation does not overcome these deficiencies...".

Examiner respectfully submits that applicant is arguing amended limitations that were not previously claimed (i.e., "storing neighboring primitives by the vertices which define the primitives and adopting an offset which is unique to each of the primitives to establish an order of calculation") which have been fully addressed in the paragraphs above.

Examiner further submits that Huang et al. teaches a preprocessing step for indexing and storing vertex data associated with the vertices that define neighboring primitives as claimed, see rationale for claim 1 above, and how or what portion of the primitives are being processed after the indexing and storing step is not being claimed.

Applicant then argues, with respect to the remarks filed 8/10/2006, "...The undersigned attorney had an interview with Examiner Prendergast and SPE Chauhan on August 9, 2006. At the interview, the claims, especially claims 1, 15 and 27 were discussed. The Examiner pointed out and relied on figure 4 of Huang '839. Applicant emphasized the use of an offset associated with the primitives for efficient storage and, in some embodiments, to specify a consistent order of calculation. The Examiner agreed to reconsider the rejection in light of claims 1 and 2 being combined so that the new claim 1 and claim 27 both recite the use of a neighbor index including an offset...".

Examiner respectfully submits that the amendment to claim 1 and new claim 27 has been addressed in the rejection of claims 1 and 27 above.

Applicant then argues, with respect to the remarks filed 8/10/2006, "...Finally, the Examiner raised the issue of a possible rejection of claims 1, 15 and 27 under 35 U.S.C. 101. Therefore, claims 1, 15 and 27 have been amended to clearly specify a use for the data storage and indexing approach claimed herein. This amendment is based on language found in paragraph [0026] of the application as filed. In view of these changes, reconsideration and allowance of the claims is requested...".

Examiner respectfully submits that amending the preamble of independent claim 1 to read "A method for execution by a data processor for indexing and storing vertex data associated with the vertices that define neighboring primitives to enhance primitive processing by the processor, comprising" does not provide a tangible result as discussed in the 35 U.S.C. 101 rejection above.

Examiner respectfully submits that amending the preamble of independent claim 15 to read "A method for execution by a data processor for indexing vertex data for data input to a graphics program to enhance primitive processing by the processor, comprising" does not provide a tangible result as discussed in the 35 U.S.C. 101 rejection above.

Examiner respectfully submits that amending the preamble of independent claim 27 to read "A method for execution by a data processor for indexing vertex data defining at least one primitive to enhance primitive processing by the processor, comprising" does not provide a tangible result as discussed in the 35 U.S.C. 101 rejection above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberta Prendergast whose telephone number is (571) 272-7647. The examiner can normally be reached on M-F 7:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RP 11/27/2006

ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER